

Chapter 6

Service Level Objectives

Introduction

As stated previously the key terms in understanding standards of response coverage are: *distribution, concentration, overall resource efficiency, response reliability and response effectiveness*. They are quantifiable performance measures that can be used by the fire department to objectively and quantitatively analyze the relationship between existing or new fire station locations and the department's capability.

The location of fire stations impacts only one segment of the continuum, travel time from the fire station. *Travel time* and *response time* are not the same thing. When we say that a particular station has a four-minute *travel time* to an address, it doesn't mean that a unit will arrive there in four minutes from the caller's viewpoint. Nor will the unit always respond from a fire station

Now that minimum staffing and equipment needs have been established for each level of risk, LF&EMS has determined how fast the entire force of staffing and equipment must reach the fire scene to be effective. Data from literature regarding fire growth and the department's own historical incidents have been used to determine the maximum travel time that would allow the staffing and equipment to get to a fire scene while a fire was still in its early stages of growth and to get to a medical scene before significant deterioration of the patient's condition occurs.

Distribution of Resources

The term "distribution" describes the resource locations needed to minimize and terminate emergencies by assuring a sufficiently rapid first due response deployment. Distribution is measured by the percentage of the jurisdiction covered by first-due, or primary, response companies within the adopted public policy response time goals for each risk type and outcome measure.

The measure of distribution is based on risk. Therefore it is possible for some low-risk response zones to have adequate distribution of coverage because they can handle longer travel times, while high-risk zones have shorter travel times and

might not get a first-due company on scene quickly enough to meet identified goals for that risk.

This view of Lynchburg's response system looks at fire & EMS resource deployment in terms of a static placement of resources and their theoretical response potential. By taking this theoretical view of the system it is possible to determine whether or not response standards can be met from existing infrastructure and with current staffing levels, when all companies and units are in quarters and available for emergency response.

Station Locations

LF&EMS uses a variety of factors to determine optimal site locations for its fire stations. These factors include pertinent national standards, including NFPA, the Insurance Services Office (ISO), and the American Heart Association with regard to cardiac arrest, covering both response time (how fast) and deployment standards (how many and what type of resources on scene).

Lynchburg's current fire station positioning does not provide a completely efficient distribution of the available emergency response resources. Two current fire stations are located within close proximity of one another and other surrounding stations. Fire Station 2, located at 2006 Grace Street, was built in 1958 and is located only about one and one-half miles from Fire Station 1 on Clay Street. The Clay Street Fire Station was built in 1980 and the primary reason that it was constructed at the current location was because the City already owned the property. Fire Station 6, located at 2084 Fort Avenue (Miller Park) was built in 1912 and is only about two miles from Fire Station 2 (Grace Street) and three miles from Fire Station 1 (801 Clay Street). When looking at the four-minute response zones for each of these three stations there is significant overlap. However, when considering the locations of current stations one, two, and six the most consideration was given to the fact that nearly all of the structure fires that occurred were within close proximity to these station locations, providing more than adequate concentration of resources.

Fire Station 7 (Lakeside Drive) and Fire Station 8 (Old Graves Mill Road) were constructed following the 1975-76 annexation of those areas of the City. In an effort to provide better fire protection to the annexed areas, these two stations were built and opened within days of one another. The reason for the site

selection was based on providing adequate distribution of resources in the annexed areas and the ability to access major thoroughfares.

In developing most of this infrastructure, the goal was to balance the elements that comprise a favorable fire station site configuration and three additional areas of consideration when selecting station locations. These areas of consideration are:

- Placement - Geographic spacing between fire stations that considers natural and human made obstacles or barriers, and provides for coverage efficiency balanced with depth of coverage through limited response zone overlap.
- Response Routes - Proximity and access to multi-directional transportation corridors, sized appropriately for fire apparatus and referred to as run streets.
- Property Acquisition - Availability, lot size, and the cost of suitable sites within the parameters of factors #1 and #2 above.

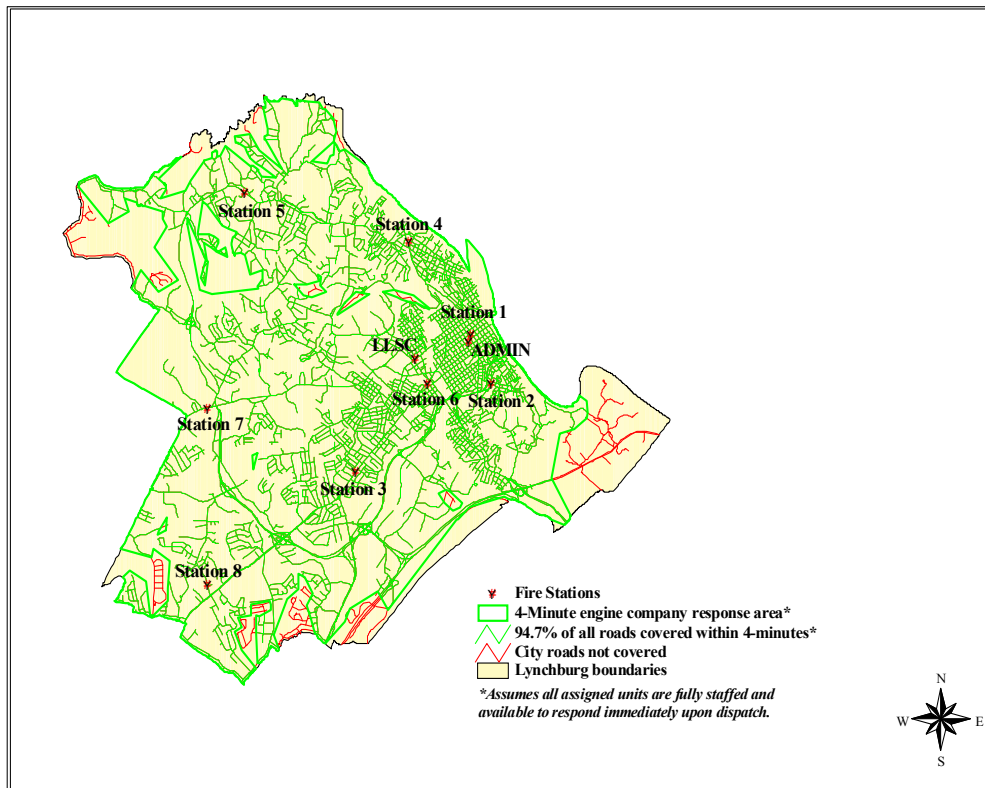
As noted above, when Fire Station 1 was constructed in 1980 consideration of property acquisition and response route factors was accomplished, but the placement factor with regards to limiting response zone overlap was not adequately addressed.

As noted in Chapter 3, *Standards, Goals and Objectives*, the department currently operates out of eight (8) fire stations divided into two geographically defined districts: Battalion One and Battalion Two. Maximum and minimum staffing capabilities are also discussed in Chapter 3 with the minimum relating to the minimum acceptable number of personnel assigned to each company or unit per shift.

In consideration of the planned replacement/relocation of Fire Stations 2 and Fire Station 6 the department should engage in a formal study of fire station locations, using geo-spacial technology, transport route analysis and property acquisition considerations.

Map 6.1

Four-Minute Engine Company Response Area¹



The above map shows that 94.7 percent of all roads within the response area are predicted to be reached by at least one engine company from current stations within a four (4) minute travel time. The roadways indicated above in red are roadways that are not reached within the four (4) minute travel time objective for the first due company.²

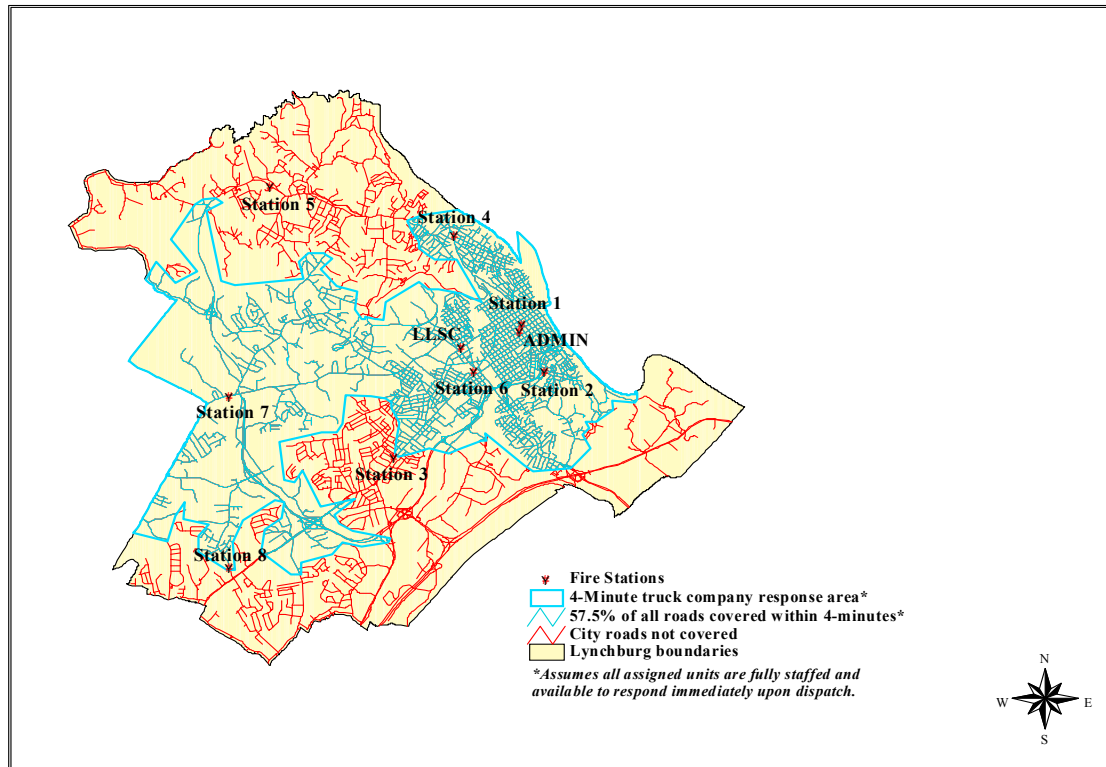
The areas that are beyond the four (4)-minute engine company travel time objective include portions of Wiggington Road (including the Boxwood subdivision), Hawkins Mill Road, Enterprise Drive (including most of Wyndhurst), the area behind Target in the Wards Crossing Shopping Center (including Chesterfield Drive, Windsor Terrace, Melinda Drive, and Alta Lane), and the Tyreeanna area, from Rockwell Road and points east.

¹Lynchburg Fire Department: Geographic Information System (GIS) Fire Suppression and Emergency Medical Service Response Capabilities Analysis, International Association of Fire Fighters, November 16, 2004.

²Ibid.

Map 6.2

Four-Minute Truck Company Response Area³



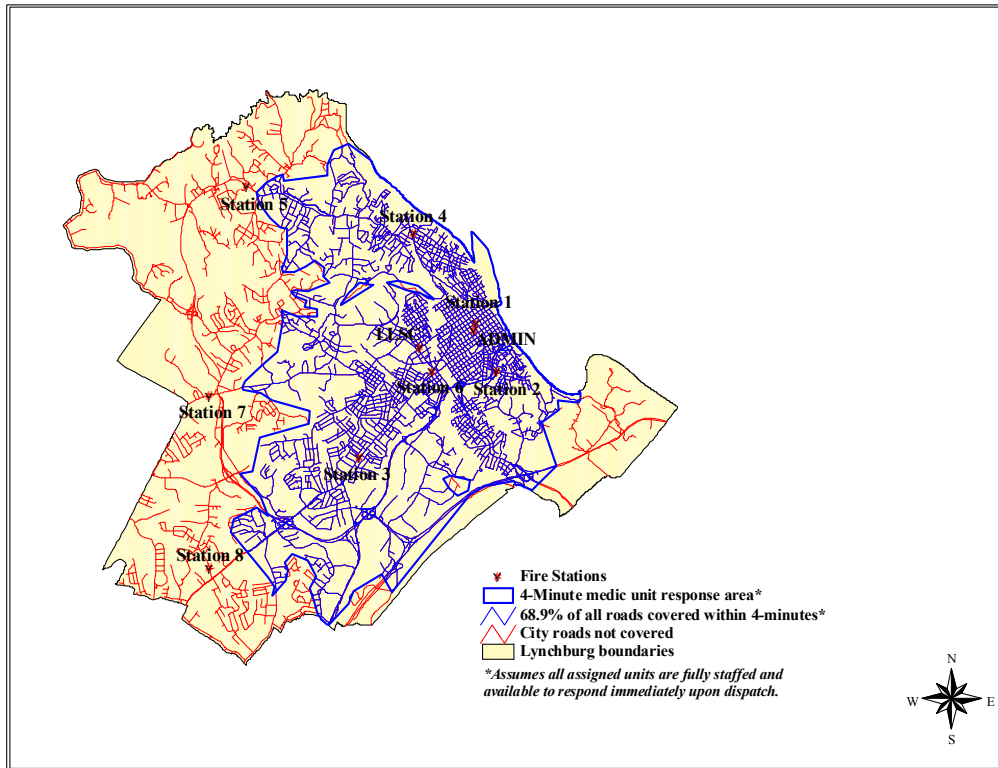
The above map illustrates that 57.5 percent of all roads are predicted to be reached by a truck company within a four (4)-minute travel time. Truck companies perform an invaluable service on the fireground and are assigned to forcible entry, ventilation, search and rescue, utility control, overhaul and salvage work. The response time measure for the truck company is actually to arrive as part of the full alarm assignment within eight (8)-minute travel time. As indicated in the map below, 99.8 percent of all roads are predicted to be reached by a truck company within eight (8) minutes.⁴

³ Ibid.

⁴ Ibid.

The map below shows those roads which are predicted to be covered by an advanced life support (ALS) medic unit within four (4) minutes. A medic unit may access 68.9 percent of roads within four (4) minutes.⁵

Map 6.3 **Four-Minute ALS Medic Unit Response Area⁶**



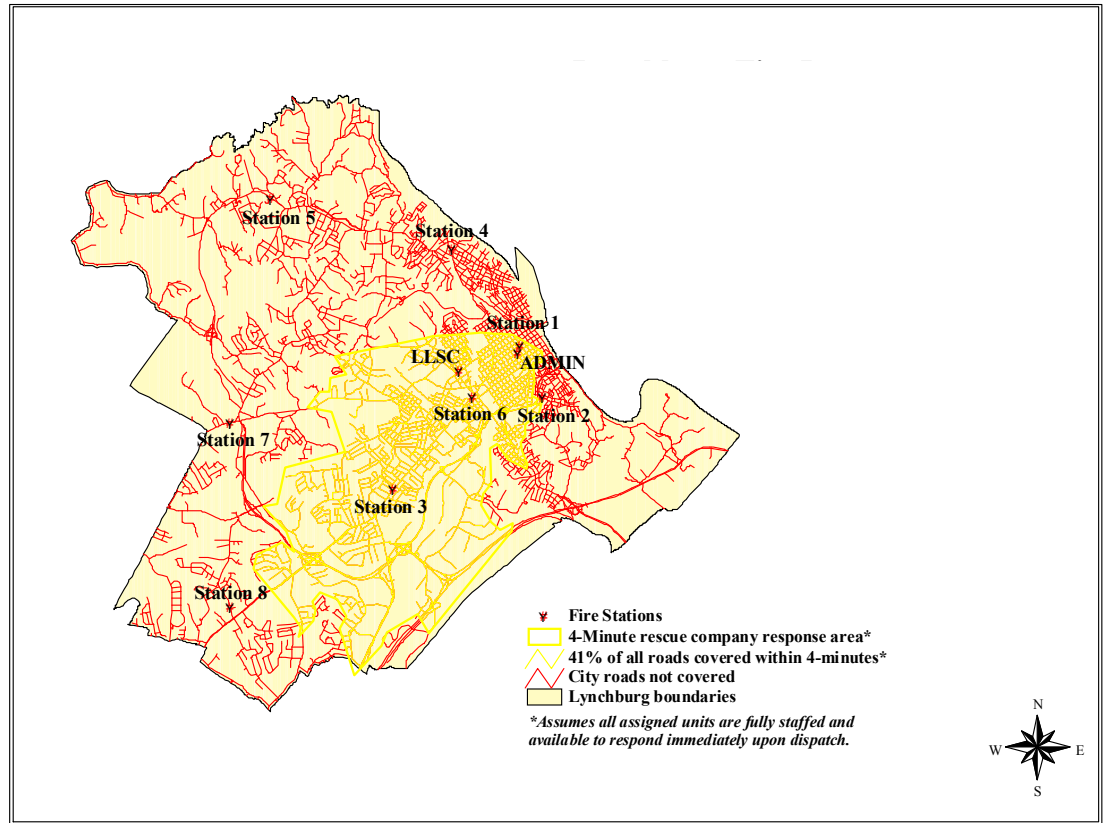
While more than 30 percent of the response area is outside of the four (4)-minute travel time objective for the medic units, EMS resources (often ALS) often arrive via an engine company within the four (4)-minute travel time objective.

⁵ Ibid.

⁶ Ibid.

Map 6.4

Four-Minute Rescue Company Response Area⁷



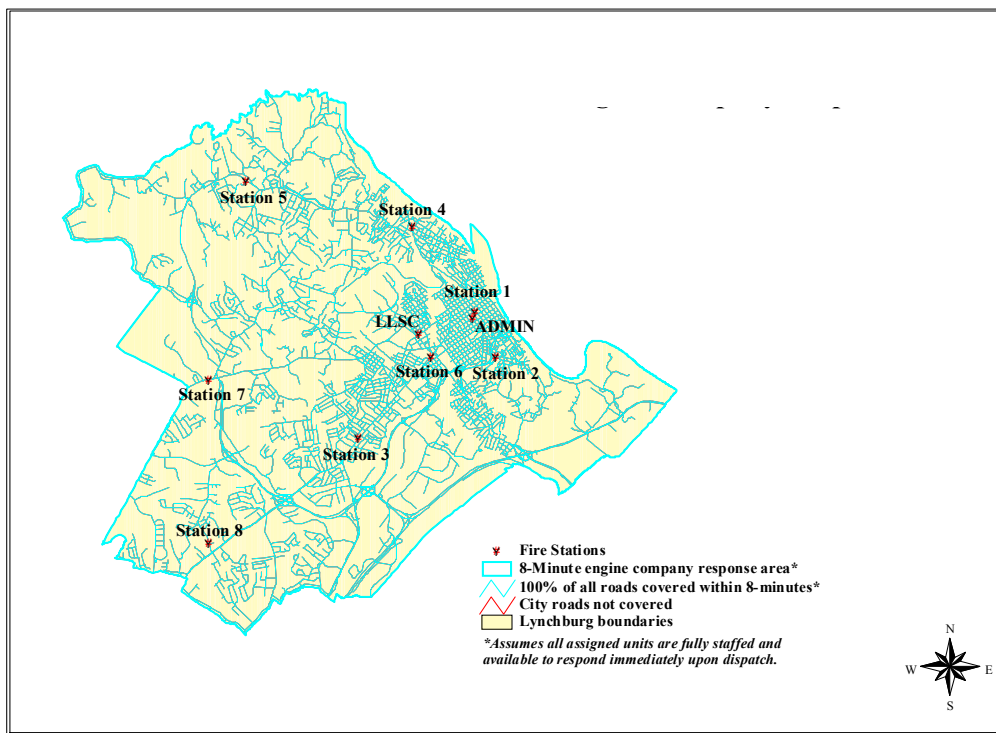
The above map illustrates that only 41 percent of all roads are predicted to be reached by a rescue company within a four (4)-minute travel time. The rescue company operates out of Fire Station 3 (Fort Avenue).

⁷ Ibid.

Concentration of Resources

Concentration is the ability to allocate enough resources on any specific risk to keep the event from becoming a major emergency. It refers to the spacing of multiple resources within close enough proximity to allow an initial effective response force to be assembled on scene within prescribed timeframes. An initial effective response force is one that has been deemed capable of stopping the escalation of a fire emergency, stabilizing a medical scene, affecting a rescue, and successfully handling an incident.

Figure 6.5 **Eight-Minute Engine Company Response Area⁸**

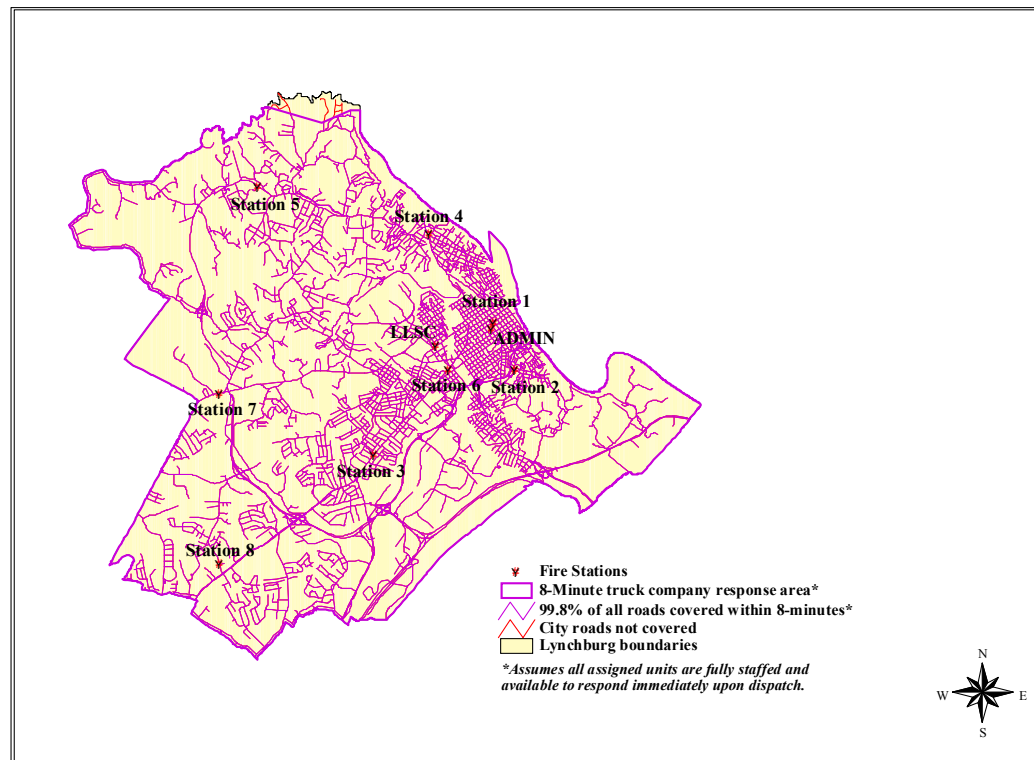


The above map shows those areas that are predicted to be covered within eight (8) minutes travel time from all fire stations. Apparatus may reach 100 percent of roads within the eight (8)-minute travel time objective. Structure fires occurring at the farthest reaches of the eight (8)-minute polygons indicated in the above map are likely to burn up to and beyond the point of flashover, which does present significant risks to fire fighters operating within the structure. This is especially true in structures which have no automatic suppression or detection systems in place.⁹

⁸ Ibid.

⁹ Ibid.

Figure 6.6 **Eight-Minute Truck Company Response Area¹⁰**



The map above indicates the predicted eight (8)-minute response capabilities of the Rescue Company responding from Station 3 (Fort Avenue). Currently, the unit is capable of assembling on 89.5 percent of all city roads within eight (8) minutes, assuming all units are available to respond immediately upon dispatch.¹¹

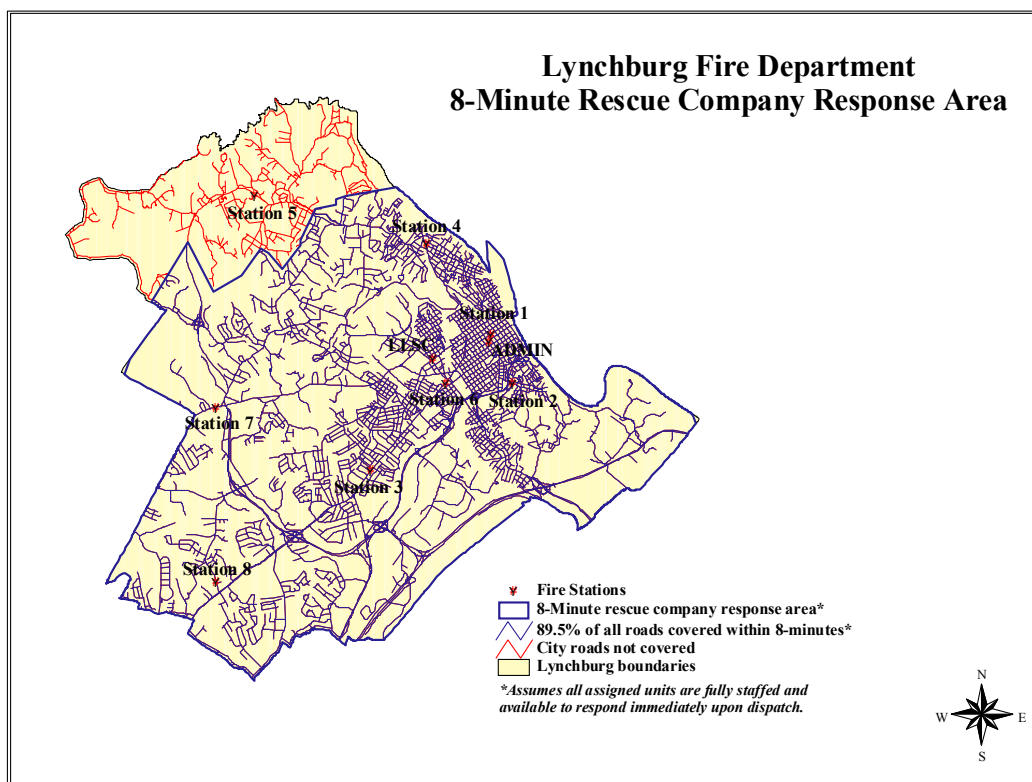
The areas outside of the eight (8)-minute truck company response area includes John Scott Drive and parts of Old Trents Ferry Road.

¹⁰ Ibid.

¹¹ Ibid.

Map 6.7

Eight-Minute Rescue Company Response Area¹²

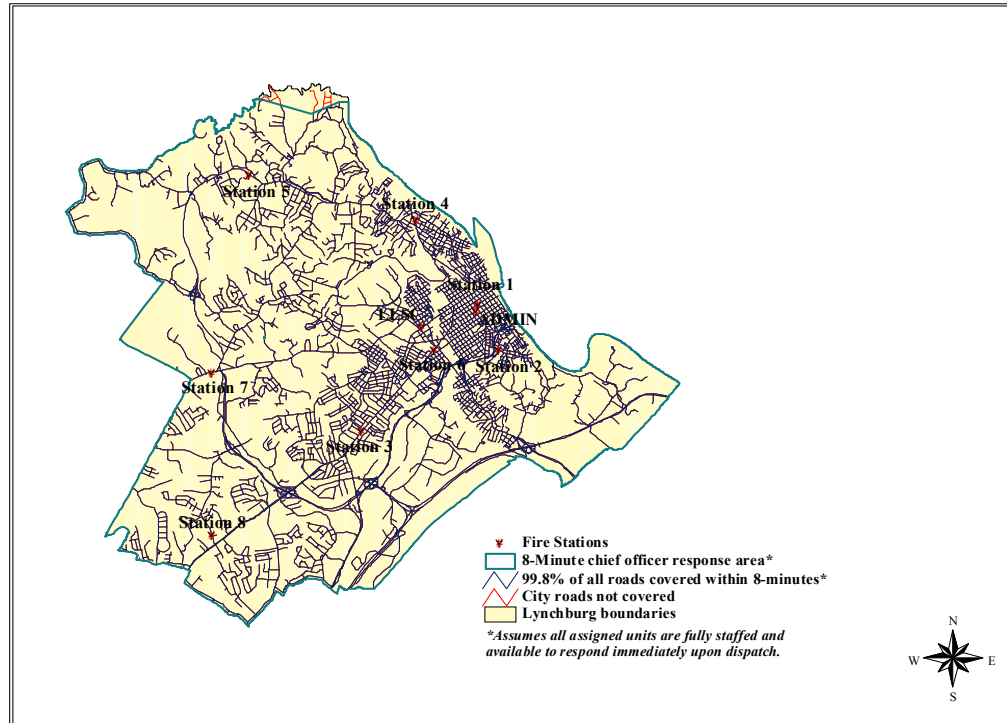


The above map illustrates that the rescue company is predicted to reach 89.5 percent of all roads in the City within the eight (8)-minute response time objective.

¹² Ibid.

The map below indicates that 99.8 percent of all roads are predicted to be reached by the Battalion Chief within eight (8) minutes.¹³

Map 6.8 **Eight-Minute Chief Officer Response Area¹⁴**



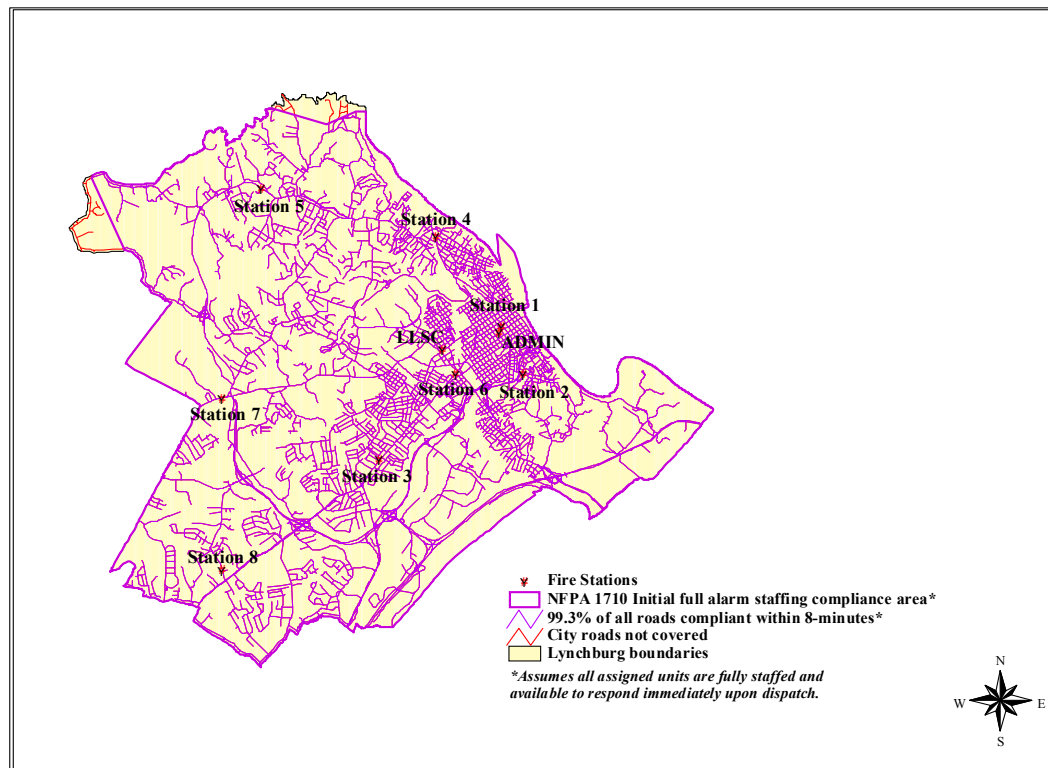
The areas that are outside of the eight (8)-minute travel time objective by the Battalion Chiefs include John Scott Drive and parts of Old Trents Ferry Road.

¹³ Ibid.

¹⁴ Ibid.

According to the dispatch procedures for a full alarm assignment for a moderate risk fire, three engines, one truck, one rescue, one medic unit and one battalion chief are dispatched. The map below illustrates that LF&EMS is predicted to be able to respond to 90 percent of all city roads within eight (8) minutes with a full alarm assignment if all units are available. The roads indicated in red on the map below are those roads that are not predicted to be able to receive the full alarm assignment within eight (8) minutes.¹⁵

Map 6.9 Initial Full Alarm Assignment Staffing Compliance Area¹⁶



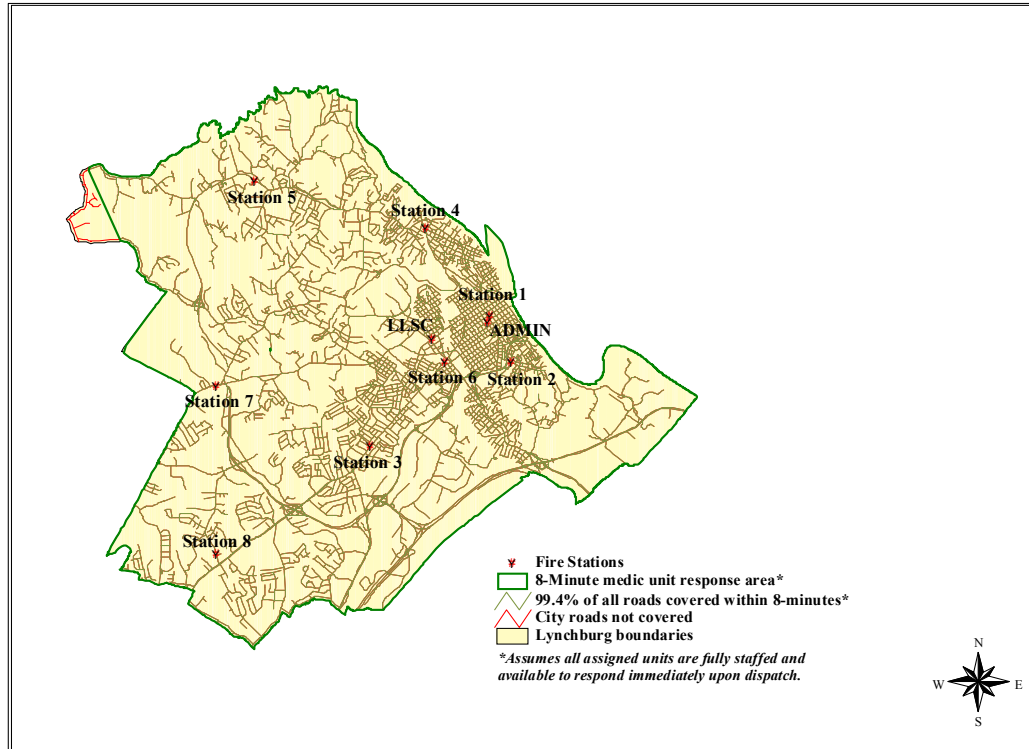
The areas that are outside of the eight (8)-minute travel time objective include John Scott Drive and parts of Old Trents Ferry Road, and a portion of Hawkins Mill, Wigginton and Coffee Roads.

¹⁵ Ibid.

¹⁶ Ibid.

The map below shows those areas that are predicted to be covered by an ALS unit within eight (8) minutes. Apparatus may reach 99.4 percent of roads within (8) minutes.¹⁷

Map 6.10 **Eight-Minute ALS Medic Unit Response Area¹⁸**



Areas that are outside of the 8-minute travel time objective are portions of Hawkins Mill, Wiggington and Coffee Roads.

Unit Performance

Analysis of the concentration of units during 2002, 2003, and 2004 combined (shown in the table below) led to the following conclusions measured against the adopted standards, NFPA 1710 and OSHA standards for response to structure fires. Responses to the entire fire protection area were included, because OSHA standards apply to all structure fire response, and NFPA 1710 does not distinguish between different risk areas for this purpose. The below table includes the full complement total reflex time for structure fires.

¹⁷ Ibid.

¹⁸ Ibid.

Table 6.1 **Total Reflex Time: Structure Fires (Full Complement): 2002-2004**

Element	Adopted Standard	80th Percentile	90th Percentile	90th Percentile, Total Elapsed Time Since Initial Dispatch
Alarm Processing	1:00	1:18	1:27	
Turnout, First in Engine	1:00	0:58	1:04	
Travel, First in Engine	4:00	3:02	3:28	4:32
Travel, Second in Engine	8:00	4:18	4:39	5:43
Travel, Third in Engine	8:00	4:59	5:22	6:26
Travel, First in Truck	8:00	4:32	4:58	6:02
Travel, First in Rescue	8:00	5:20	5:36	6:40
Travel, First in Medic	8:00	3:49	4:05	5:09
Travel, First in Battalion Chief	8:00	4:33	4:47	5:51
Travel, Full Complement	8:00	5:20	4:45	6:40
Total Reflex Time (Customer Interval)	10:00	7:36	8:07	

- Alarm processing time at the 90th percentile is 1:27, which is over the one-minute alarm processing time standard by 27 seconds.
- Turnout time at the 90th percentile was 1:04, which is over the one-minute turnout time standard by 4 seconds.
- 1st engine travel time at the 90th percentile was 3:28, which is under the four-minute travel time standard by 32 seconds.
- 2nd engine is the usual method of meeting the OSHA Two-In/Two-Out rule. Travel time for the 2nd engine at the 90th percentile was 4:39.
- The department met the deployment standard of 15 firefighters on scene on all structure fires, and the travel time was 4:45 at 90th percentile, meeting the 8-minute standard time by 3:15.

The data shows that LF&EMS' current concentration of resources is meeting the NFPA 1710 standard and the OSHA Two-In/Two-Out Rule is also being met on structure fire responses. This is because the OSHA rule is based on the number of firefighters who must be on scene before an entry is made, independent of deployment-based response times. If this is not continued, the department could slide out of compliance with the NFPA standard, and the service level provided to the community will be reduced.

Analysis of the concentration of resources during 2002, 2003, and 2004 led to the following conclusions for objectives for response to residential fire alarms.

- Alarm processing time at the 90th percentile is 1:27, which is over the one-minute alarm processing time objective by 27 seconds.
- Turnout time at the 90th percentile was 1:20, which is over the one-minute turnout time objective by 20 seconds.
- 1st engine travel time at the 90th percentile is 4:37, which is over the four-minute travel time objective by 37 seconds. Since LF&EMS response procedure for a residential fire alarm is the first-due engine company, this also represents the full complement objective.

Table 6.2 **Response Time: Residential Fire Alarms: 2002 -2004**

Residential, Element	Adopted Standard	80th Percentile	90th Percentile	90th Percentile, Total Elapsed Time Since Initial Dispatch
Alarm Processing	1:00	1:19	1:27	
Turnout, First in Engine	1:00	1:10	1:20	
Travel, First in Engine	4:00	4:23	4:37	5:57
Travel, First in Truck	N/A	N/A	N/A	N/A
Travel, Full Complement	4:00	4:23	4:37	5:57
Total Reflex Time (Customer Interval)	6:00	6:52	7:24	

Analysis of the concentration of resources during 2002, 2003, and 2004 led to the following conclusions for objectives for response to commercial fire alarms.

- Alarm processing time at the 90th percentile is 1:18, which is over the one-minute alarm processing objective by 18 seconds.
- Turnout time at the 90th percentile was 1:13, which is over the one-minute turnout time objective by 13 seconds.
- 1st engine travel time at the 90th percentile is 3:37, which is under the 4-minute travel time objective by 23 seconds.
- 1st truck travel time at the 90th percentile is 4:49, which is under the 8-minute travel time objective by 3:11.
- The department met the deployment objective of 6 firefighters on scene within 10 minutes total reflex time for commercial fire alarms by 2:44.

Table 6.3 **Response Time: Commercial Fire Alarms: 2002-2004**

Commercial, Element	Adopted Standard	80th Percentile	90th Percentile	90th Percentile, Total Elapsed Time Since Initial Dispatch
Alarm Processing	1:00	1:13	1:18	
Turnout, First in Engine	1:00	1:05	1:13	
Travel, First in Engine	4:00	3:21	3:37	4:50
Travel, First in Truck	8:00	4:32	4:49	6:02
Travel, Full Complement	8:00	4:13	4:45	5:58
Total Reflex Time (Customer Interval)	10:00	6:31	7:16	

Analysis of the concentration of resources during 2002, 2003, and 2004 led to the following conclusions for objective for response to EMS – Emergent calls for service.

- Alarm processing time at the 90th percentile is 1:09, which is over the one-minute alarm processing time objective by 9 seconds.
- Turnout time at the 90th percentile is 1:09, which is over the one-minute turnout time objective by 9 seconds.

- 1st engine travel time at the 90th percentile is 3:27, which is under the 4-minute travel time objective for basic life support providers to arrive on the scene by 33 seconds.
- Travel time at the 90th percentile for the medic units is 4:43, which is under the 8-minute travel time objective for advanced life support providers to arrive on the scene by 3:17 seconds.
- LF&EMS met the deployment objective for having a basic life support team on the scene within a 6-minute total reflex time by 15 seconds and an advanced life support team on the scene within a 10-minute total reflex time objective by 2:59.

Table 6.4 **Response Time: EMS – Emergent: 2002-2004**

EMS - Emergent	Adopted Standard	80th Percentile	90th Percentile	90th Percentile, Total Elapsed Time Since Initial Dispatch
Alarm Processing	1:00	1:01	1:09	
Turnout, First in Engine	1:00	1:00	1:09	
Travel, First in Engine	4:00	3:16	3:27	4:36
Travel, First in Medic	8:00	4:06	4:43	5:52
Total Reflex Time (Customer Interval)	10:00	6:07	7:01	

Analysis of the concentration of resources during 2002, 2003, and 2004 led to the following conclusion for objective for response to EMS – Urgent calls for service.

- Alarm processing time at the 90th percentile is 1:25, which is over the one-minute alarm processing time objective by 25 seconds.
- Turnout time at the 90th percentile was 1:19, which is over the one-minute turnout time objective by 19 seconds.
- 1st medic unit travel time at the 90th percentile is 5:20, which is over the four-minute travel time objective by 1:20. Since LF&EMS response procedure for a EMS – Urgent incident is the first-due medic unit, this also represents the full complement objective.

- 1st medic unit total reflex time at the 90th percentile is 8:04, which is over the six (6)-minute total reflex time objective by 2:04.

Table 6.5 **Response Time: EMS – Urgent: 2002-2004**

EMS - Urgent	Adopted Standard	80th Percentile	90th Percentile	90th Percentile, Total Elapsed Time Since Initial Dispatch
Alarm Processing	1:00	1:14	1:25	
Turnout, First in Medic	1:00	1:05	1:19	
Travel, First in Medic	4:00	4:30	5:20	6:39
Total Reflex Time (Customer Interval)	6:00	6:49	8:04	

Analysis of the concentration of resources during 2002, 2003, and 2004 led to the following conclusions for objective for response to hazardous materials calls for service.

- Alarm processing time at the 90th percentile is 1:32, which is over the one-minute alarm processing time objective by 32 seconds.
- Turnout time at the 90th percentile is 1:12, which is over the one-minute turnout time objective by 12 seconds.
- 1st engine travel time at the 90th percentile is 4:18, which is over the 4-minute travel time objective for basic life support providers to arrive on the scene by 18 seconds.
- The hazardous materials unit is usually dispatched either after the arrival of the first unit to confirm the presence of a hazardous materials scene or after the dispatcher receives additional information that upgrades the response. Nonetheless, the travel time for the hazardous materials unit at the 90th percentile is 7:09, which is under the 10:00 travel time objective by 2:51.
- LF&EMS met the deployment objective for having an effective response force on the scene of a hazardous materials emergency in 12-minute total reflex time is met with a total reflex time of 9:53 at the 90th percentile.

Table 6.6 **Response Time: Hazardous Materials Incidents: 2004-2004**

Hazardous Materials	Adopted Standard	80th Percentile	90th Percentile	90th Percentile, Total Elapsed Time Since Initial Dispatch
Alarm Processing	1:00	1:18	1:32	
Turnout, First in Engine	1:00	1:04	1:12	
Travel, First in Engine	4:00	3:34	4:18	5:30
Travel, Haz Mat Unit	10:00	6:23	7:09	8:21
Travel, First in Rescue	8:00	6:31	6:43	7:55
Travel, First in Medic	8:00	6:22	6:50	8:02
Travel, First in Battalion Chief	8:00	4:45	5:11	6:23
Total Reflex Time (Customer Interval)	12:00	8:45	9:53	

Analysis of the concentration of resources during 2002, 2003, and 2004 led to the following conclusions for objective for response to technical rescue calls for service.

- Alarm processing time at the 90th percentile is 2:00, which is over the one-minute alarm processing time objective by 1 minute.
- Turnout time at the 90th percentile is 0:57, which is under the one-minute turnout time objective by 3 seconds.
- 1st engine travel time at the 90th percentile is 4:58, which is over the 4-minute travel time objective by 58 seconds.
- The technical rescue unit is usually dispatched either after the arrival of the first unit to confirm the presence of a technical rescue scene or after the dispatcher receives additional information that upgrades the response. The travel time for the technical rescue unit at the 90th percentile is 15:33, which is over the 12-minute travel time objective by 3:33.
- LF&EMS does not meet the deployment objective for having an effective response force on the scene of a technical rescue emergency in 14-minute total reflex time with a total reflex time of 18:30 at the 90th percentile.

Table 6.7 **Response Time: Technical Rescue Incidents: 2002-2004**

Technical Rescue	Adopted Standard	80th Percentile	90th Percentile	90th Percentile, Total Elapsed Time Since Initial Dispatch
Alarm Processing	1:00	1:36	2:00	
Turnout, First in Engine	1:00	0:48	0:57	
Travel, First in Engine	4:00	3:46	4:58	5:55
Travel, Tech Rescue Unit	12:00	13:21	15:33	16:30
Travel, First in Rescue	8:00	6:40	8:19	9:16
Travel, First in Medic	8:00	4:35	5:48	6:45
Travel, First in Battalion Chief	8:00	2:26	4:17	5:14
Total Reflex Time (Customer Interval)	14:00	17:57	18:30	

As was previously discussed, demand for emergency services varies significantly depending on the time of day. The LF&EMS may wish to attempt to improve in the area of medic unit response by modifying its deployment of units according to measurable peak demand periods. Peak activity ambulance deployment improves resource distribution through the practice of dynamic up-staffing during peak periods and down-staffing during statistically low call volume periods. Peak activity ambulances also improve resource concentration by providing extra resources within the system that are deployed into population concentrations such as the downtown core area during business hours. This is especially useful during hours when heavy traffic impedes responding apparatus.

Factors That Have Affected Response

Topography and Transportation Network

Two of the most significant factors affecting the LF&EMS' responses include natural and manmade barriers. As stated in Chapter 4, *Risk Assessment*, the rolling (and often steep) terrain dictates the areas of development throughout the city.

The transportation networks connecting these areas of development are also affected by the terrain. The transportation network of Lynchburg is far from being a “gridded” system often seen in more urban areas. It can be noted from viewing maps of response zones with transportation routes marked that areas that are either not covered or are just within a four-minute travel time boundary could be provided with a quicker travel time if the transportation routes appropriately connected the various areas of development.

For example, Lynchburg’s newest and fastest growing development – Wyndhurst – can not be reached within the four-minute response time goal simply because of the transportation routes that allow access to the development. Having opportunities exist to provide additional transportation routes into the community, if public safety is of public concern to the residents and property owners of the community and to the elected officials who represent them.

The Wyndhurst community can also be used as an example of areas of the City where department responses require travel into a neighboring county and then back into the City because of transportation routes. When entering into the neighboring counties, emergency responders actually travel through areas that are serviced by volunteer fire and EMS agencies of those counties. This actually presents an opportunity for regional cooperation with surrounding counties for automatic aid agreements to avoid duplication or overlapping of service deliveries. Of particular importance is the fact that the volunteer agencies are rarely staffed at levels that would allow those agencies to provide resources in order to meet the adopted total reflex time response goals. In short, the county residents would actually benefit more than city residents.

Additionally, the limited access Route 29 Expressway limits the ability of some companies to reach incident scenes within specified goals because of the limited points where the Expressway can be “crossed.” Currently, the only two points that allow for easy access across the Expressway are Campbell Avenue/Kemper Street and Candler’s Mountain Road.

Training

In the past three years, the Department has realized a significant increase in the amount of on-duty training opportunities. This was the result of strategies identified in the department’s strategic plan and also as a result of limiting the

amount of compensatory time and overtime liability associated with members obtaining necessary training while off-duty. Training opportunities are usually coordinated at the Central Virginia Regional Emergency Services Training Center or at Fire Administration. The training center is located on property adjacent to the Lynchburg Regional Airport, located in Campbell County. Training is also conducted in a manner to maximize the efficient use of instructor time and cost, by conducting training for half of the on-duty units at one time and later for the other half. As a result, there is a higher incidence of units being out of service or out of position to respond in a manner which meets the total reflex time response goals. Attempts to coordinate on-duty training sessions with fewer resources placed “out-of-service” and “out of position” to assist in meeting total reflex time response goals should be explored. Although anticipated to be very costly, the feasibility of a more centralized training facility within the City should be evaluated.

Retirements and Paid-Time Off

The City of Lynchburg’s annexation of portions of Bedford and Campbell County in 1975-76 resulted in the need for additional fire protection in the annexed areas. In order to accomplish this, there was a need to construct two additional fire stations (Lakeside Drive and Old Graves Mill Road Stations) and hire additional staffing for each of those stations. As a result of the large number of members hired at that time and the institution of an early retirement option after twenty-five (25) years of service under the Virginia Retirement System, there have been and will continue to be a significant number of retirements from the department. This has resulted in staffing shortages which has left equipment out of service on numerous occasions.

Another reason for units being out of service has been the number of members with large balances of annual leave or compensatory time. The current leave scheduling system coordinated by the Battalion Chiefs allows for six members to be off on a daily basis (advanced scheduling). However, because of changes in the Fair Labor Standards Act, Battalion Chiefs are “exempt employees” and are not included in the leave scheduling process. They now are allowed to schedule themselves off as deemed appropriate. These circumstances, in addition to unforeseen reasons such as sick leave, funeral leave, and military deployments, result in the number of days that at least one piece of apparatus (usually an engine company) being placed out of service on a routine basis.

Responding to Change

The safety of the public and firefighters must remain a priority when apportioning additional resources and planning for the future. With the ever-increasing challenges posed by rising costs and revenues that have not in recent years kept pace with the department's cost curve, fire managers are faced with constructing response plans that stretch response resources and personnel. The balance is to achieve efficiency while still meeting the safety standards such as the OSHA-mandated Two-In/Two-Out rule and NFPA 1710.

In addition, there is the concept of deploying additional response resources during periods of peak activity to increase concentration of resources and response reliability, while decreasing response time. What makes this deployment model attractive is the matching of additional resources during periods of increased call volume, when needed, which also coincides with traditional periods of on-duty training and periods of high traffic congestion which slows response. At the same time the cost for staffing a peak activity unit is significantly less than staffing a uniformly deployed 24/7 response company or unit.

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